

REMARKS**Status of claims**

All pending claims 3 to 8 and 22 to 36 have been rejected as unpatentable under 35 U.S.C. sec. 103.

Claim 35 has here been canceled without prejudice.

Amendment to claims

Claim 26 has here been amended to incorporate the language of claim 35.

Rejections under §103

Claims 3 to 8 and 22 to 36 have been rejected under 35 U.S.C. sec. 103 as obvious based on Rau et al. (U.S. Patent No. 4,162,908) and Ruppert et al. (U.S. Patent No. 5,788,730) combined with Meyer (U.S. Patent No. 4,990,740) or Kamp et al. (U.S. Patent No. 4,990,740).

Reconsideration of this rejection is respectfully requested.

Independent Claim 24 as here amended clearly recites a method that provides for the production of a quartz glass preform by a plasma-assisted deposition process with a deposition burner that focuses a media flow onto a plasma zone. The claimed method enhances the deposition efficiency of the plasma outside deposition (POD) process, and is not suggested by the prior art.

Claim 24 as here amended recites a method for producing a preform from synthetic

quartz glass by a plasma-assisted deposition process that comprises supplying a hydrogen-free media flow containing a glass starting material and a carrier gas to a multi-nozzle deposition burner, and introducing the glass starting material by the deposition burner into a plasma zone. The glass starting material is oxidized so as to form SiO₂ particles, and the SiO₂ particles are deposited on a deposition surface while being directly vitrified. The deposition burner focuses the media flow towards the plasma zone, and the deposition burner includes a media nozzle that focuses the media flow onto the plasma zone. The media nozzle has a wall defining a passage communicating with a nozzle opening so that media flow passes through the passage and through the nozzle opening to the plasma zone. The wall is configured so that, adjacent to the nozzle opening, the passage tapers inwardly in the direction of the plasma zone, and the tapering portion has a length of at least 5 mm.

Rau teaches producing quartz glass by a plasma deposition process (POD). A hydrogen-free gas stream containing a silicon compound is heated and passed through a plasma burner and oxidized product is deposited on a support as a vitreous mass. See Rau col. 1, line 64, to col. 2, line 3. The plasma burner consists of a metal base 9 and three quartz glass tubes 10, 11, 12, that are sealed from one another. Rau col. 3, lines 56 to 58, FIGS. 1 and 2. Tube 10 discharges the gas stream.

Rau teaches the known method in the art for producing quartz glass by a plasma deposition process (POD). In contrast to claim 24, which recites a deposition burner with a tapered media nozzle that focuses media flow onto a plasma zone, Rau only shows a cylindrical plasma burner, and fails to suggest or teach any tapering of a media nozzle nor focusing of

media flow onto a plasma zone. The Examiner has conceded that Rau does not show a tapered media nozzle.

The method recited in claim 24 is therefore not suggested by Rau.

Ruppert teaches a process and apparatus for the production of a quartz glass blank using a flame hydrolysis burner in an outside vapor deposition (OVD) method. A gaseous silicon-containing starting material reacts in the gas flame of a multi-nozzle burner head to form SiO₂ soot particles in a reaction zone. See Ruppert col. 1, lines 1 to 12. The glass starting material is introduced into the flame by a central pipe 2 via a cylindrical central nozzle 6, 16. Ruppert col. 5, lines 34 to 35, and drawing.

Ruppert teaches a flame hydrolysis method and not a plasma deposition process, as taught by Rau, and therefore the argued combination of these two quite different processes is improper.

Furthermore, looking at simply the structure of Ruppert, it fails to suggest a method as claimed. Ruppert shows a tapering of the boundary walls of the barrier gas nozzle 7 and the inner boundary wall of the central pipe 2. Ruppert has no plasma zone therefore does not suggest any focusing or tapering in the direction of a plasma zone, and the central nozzle of Ruppert carrying the glass starting material has a central nozzle 6, 16 with a *cylindrical* passage that does not focus flow of the glass starting material toward anything, let alone a plasma zone not present in the reference.

Ruppert therefore cannot be properly combined with Rau, and even if so combined would not suggest a method as set out in claim 24.

Meyer teaches an inductively coupled plasma torch 10 used in conjunction with a spectrometer 25. A plasma region 24 is produced, and a gas containing a sample is ionized and injected into the plasma region for analysis. See Meyer, col. 1, lines 5 to 13. The torch 10 consists of three tubes 16, 18, 27. See Meyer, FIG. 1. The inner tube 27 is connected to a nebulizer 28 at the bottom end of the tube and propels pressurized aerosol gas into the plasma region 24. Meyer col. 6, lines 25 to 34.

The Examiner incorrectly cites Meyer for a teaching of a tapered nozzle. Meyer discloses an inner tube 27 with a tapered portion only near the upper portion 60 of the tube but not adjacent the tip of the exit nozzle 56, as recited in claim 24. In fact, the part of the tube where the pressurized gas exits the nozzle 56 is a purely cylindrical passageway, and is not tapered in any way.

Furthermore, Meyer shows a plasma torch, and does not show or suggest a plasma deposition process. The field that Meyer addresses is quite different from plasma deposition, and therefore it cannot be properly combined with the process of e.g., Rau, which teaches plasma deposition.

Meyer therefore does not suggest a tapered media nozzle or a method as set out in claim 24.

Kamp teaches a plasma torch 1 for generating a plasma beam. See Kamp, col. 1, lines 13 to 17. The Kamp plasma torch 1 has two gas flow channels 11, 13. See Kamp, FIG. 2. Cylindrical channel 13 surrounds the central electrode and feeds a cooling gas flow around it.

See Kamp, col. 1, lines 53 to 55. Channel 11 is tapered so that it supplies a gas flowing through it to converge the plasma beam generated at electrode 7, which is connected to a high frequency generator. See Kamp, col. 1, lines 54 to 58, col. 4, lines 4 to 6.

The plasma generated in Kamp is within the nozzle. Claim 24 as amended clearly requires that the media flow passes through the opening of the nozzle before reaching the plasma zone. Kamp therefore is not applicable to a plasma deposition method in which a media flow out of a tapered nozzle is focused to a plasma zone beyond the end of the nozzle and oxidized. Kamp therefore also fails to suggest or teach a method using a deposition burner with a tapering media flow nozzle for focusing media flow onto a plasma zone.

For the foregoing reasons, claim 24 distinguishes over the cited prior art.

Independent claim 26 recites structure similar to that of claim 24 discussed above, and distinguishes over the prior art for similar reasons.

All other pending claims depend directly or indirectly from claims 24 and 26 and therefore distinguish therewith over the prior art.

All claims having been shown to distinguish over the prior art in structure, function, and result, formal allowance is respectfully requested.

Should any questions arise, the Examiner is invited to telephone attorney for applicants at 212-490-3285.

Respectfully submitted,

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